The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

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The Chemical Age

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Long-Service Containers

WITH war-time vicissitudes, and the urgent demands of essential war-time industries, the amount and variety of materials available for the manufacture of containers has inevitably become restricted. Orders for the "control of tins, cans, kegs, packaging-pails, etc.," issued by the Ministry of Supply this year, have already amounted to seven in number, and with their appended schedules, directions, and what not, have accounted for a good deal of pulp that might (with a little adjustment of operating conditions) have been manufactured into a goodly supply of containers of the heavy paper type.

Chemical manufacturers of good will and good sense, however, realise that these Government Control Orders are in great part necessary, despite their wealth of apparently unnecessary verbiage; and they have accordingly girt up their loins and tackled the container problem with a will. If new containers are not to be had, the old ones must serve for a longer period. There comes a time, of course, when a container, past its prime, becomes positively dangerous to use; but there is a big difference in length between the life of a container that is properly treated in operation, and the period of service of one that is carelessly or inconsiderately bandied about. An article in this issue of THE CHEMICAL AGE suggests a few simple methods, by observing which both buyer and seller of chemicals can ensure that their products may remain uncontaminated although the packages which hold them may have been used and re-used many times.

It is the tin shortage which is accountable for much of the difficulty concerning containers. Substitutes for this invaluable metal are not always easy to come by; and its recovery from tinned material is, to say the least of it, dubiously economic. The usual cry of "plastics" has been raised, as might have been expected, but plastic materials, on account of their many virtues, are themselves in tremendous demand for all kinds of war-time purposes besides the obvious one of providing receptacles for the transport and storage of goods. They do not, therefore, provide a complete solution of the difficulty, and other sources must be tapped.

There comes into mind one old-fashioned material, none the worse for its immemorial use, and that is wood; and both hardwood and softwood are invaluable to the chemical industry, as we have often pointed out. Casual observers are apt to think of larch plantations as being nothing more than a supply of potential pit-props, and oak coppices as a source of beer-barrel staves. But a knowledgeable vatmaker would put a very different construction on the value of our native woods. This is not the place to give a catalogue of the numerous applications, for storage and transport, of this ancient and homely material; but it offers just the sort of simple solution to many a problem which may have baffled a searcher engaged in looking for a more abstruse answer. He has not, in fact, been able to see the wood for the trees. An interesting sidelight is thrown by the news that certain of our Crown Colonies have been increasing their output of products such as edible oils in view of shortages elsewhere. The usual tins to hold these oils are not available and the producers have turned to wood as the best alternative. Incidentally, from the service point of view, wood has an excellent record, it is far from easy to wear out by rough handling, although it can deteriorate rapidly by reason of faulty storage conditions.

Reverting to metal containers, we are glad to see that special attention has been paid recently to the question of tight closures, to soldering and jointing problems, and to the general improvement of structural lines. All these features tend towards the prolongation of the serviceable life of containers, to economy in materials, and to robustness of constitution. We have to "dilute" our skilled labour in time of war; but there is no reason why we should find our precious chemicals diluted owing to leaky drums whose poor construction has offered weak resistance to unskilled handling.

The question of long duration of service, naturally, does not arise when non-returnable vessels are under consideration. Nevertheless, these containers, too, are liable, under war-transport conditions, to unnecessary suffering by reason of inept handling and clumsy packing. Makers and users of non-returnable drums are no doubt fully aware that the available loading personnel and the available space are not the same as they were in peace-time; and it may be an advantage in the long run to sacrifice loading time by packing materials in smaller containers than usual, in order to ensure that the contained products reach their destination safely. Perusal of the pages which follow will disclose the information that makers of container materials generally are well advised of the state of affairs. Particular care is being taken to ensure that economy and durability of material are achieved; and with the help of the user the attainment of long service should be readily manageable.

In fact, as in so many other instances in war time, adaptability and willingness to recognise the limitations imposed by abnormal conditions are the qualities that win the day; and, with proper use of the materials and labour that are now on hand, all those who have to deal with containers can work towards the successful movement of the chemical industry if they will bear these facts in mind.

On Other Pages

NOTES AND COMMENTS

Destruction of Nazi Chemical Plant

AMPLE evidence is to hand of the substantial damage to the German chemical industry wrought by the R.A.F. in their constant raids on the enemy's big commercial centres. Again and again the R.A.F. have returned to the attack on important chemical factories, one of the latest visits being to those at Osnabrück a few days ago. Prominent in the list of buildings damaged and destroyed in the recent thousand-bomber raid on Cologne were a number of well-known chemical works. These included the Berlin Anhaltische Maschinenbau, where one shed was destroyed and six or seven sheds damaged, the Chemische Fabrik works and the Jak Scholossen warehouses which were left with seven buildings gutted. The dyestuffs concerns of Bruno Lampel and Nussbaum and Co. were also badly hit. Attacks on the Nazi chemical industry go back to the days of 1940 when, with a much smaller force at their command than they have to-day, the R.A.F. were carrying out devastating raids on the very heart of the enemy war machine, while the Germans scattered their efforts on indiscriminate bombing of our towns. And, of course, we have kept it up!

"Ersatz" Rubber and Oil

ONE of the chief concerns of the R.A.F. has been the destruction of the "ersatz" plant and materials with which the Nazis hoped to supply the deficiencies in their imports of such things as oil and rubber. Vast quantities of these expensive substitutes are essential to the Germans and the fact that they must be made "on the premises" makes them vulnerable to attacks from our bombers. The output of "Buna" synthetic rubber must have been severely affected by the heavy bombardment at Hüls a few months ago, while the systematic raids on Germany's synthetic oil plants may have something to do with the fact that Hitler's famous "autobahnen," built to carry a tremendous volume of wartime traffic, are reported to be almost deserted. Leuna is a familiar name to those who follow the Air Ministry bulletins. It is here that the great synthetic oil plant of I.G. Farbenindustrie is situated, with a normal production of 400,000 metric tons of oil a year. There is reason to hope that, after the visits of the R.A.F., production is now something below normal. When the R.A.F. bombers go to the Ruhr it is often with the object of attacking once again the great hydrogenation plants of Gelsenkirchen which have received numerous visits, while at Politz, near Stettin, widespread destruction has been done to the synthetic oil plant which had an annual output capacity of over a million metric tons of motor fuel. It must, of course, be remembered that the rehabilitation of German industry after raids is a first charge on Nazi labour, but often it happens that valuable plant which will take years to replace is blasted to pieces, to say nothing of the even more destructive raids to come.

Non-Metallic Containers

AN important aspect of the present-day containers problem, both from the user's and from the maker's point of view, is the need to decide what material is ultimately likely to prove most practical under war conditions. In certain instances the ideal material may be unobtainable, or in short supply, and the question as to the exact meaning of "essential purposes" may arise. At all events, the desirability of studying the practicability of substitutes becomes every day more urgent. The man in the street, reading about the extensive demand for iron and steel for the major purposes of war, is apt to quote "plastics" as a sort of general panacea for all supply problems of the kind involved. But plastics themselves are in great demand, as well as the raw materials from which they are manufactured, so that the answer is not quite so simple. It is beginning to appear more and more clearly that the real solution of the problem, where steel or plastics are really unobtainable, lies in the substitution of other non-metallics, *e.g.*, wood, glass, and stoneware. These are, all three, materials of proved advantages in the chemical world, and though, of course, they all have their limitations, the industries dealing with them have not been idle. Some aspects of the position are dealt with in the later pages of this issue, and it is hoped that these may be of help to the overworked plant manager, in his continual efforts to keep the chemical industry running smoothly while fitting in always with war-time national economy.

No Restrictions on Glass

THE value of glass for containers in present conditions is emphasised by the fact that this section of the container industry is free from restrictions on the supply of raw materials, an advantage which probably cannot be claimed by any other side of the trade. Point was given to the favourable position in which this places manufacturers of glass containers by the recent remarks of Colonel Charles E. Ponsonby, T.D., M.P., in his review at the annual meeting of Forster's Glass Company. Colonel Ponsonby, who is chairman of the company, said that the glass container industry has occupied and is occupying an increasingly important position in supplying the needs of the country at the present time. "It is satisfactory to know," he went on "that the industry as a whole has been congratulated by various Government departments on the excellence of its organisation and the efficient methods used in conducting its business." While Forster's Glass Company does not itself make containers for the chemical industry, it is significant that "the industry as a whole has been congratulated." If, as well as having the raw materials in sufficient quantity and an increasing demand for its wares, the trade can boast so efficient an organisation as to draw comment from Government Departments, which are not over-hasty in giving praise for services rendered, it well deserves any lasting benefit which the present opportunity of expansion may give it.

For the Transport of Milk

WHILE on the subject of glass containers, we recall a point raised recently by Mr. Ben Davies, director of laboratories to United Dairies, Ltd. There are, of course, special problems involved in the transport of milk, for the health of the people is closely bound up with the delivery of this food in a condition of purity. Mr. Ben Davies pointed out to us that there had been, before the war, a movement towards stainless steel for the large containers used by his company. The war, however, interfered with the change-over and many glass-lined containers are now being employed for milk transport. House-to-house delivery, of course, still requires vast quantities of glass containers. In this respect, United Dairies have a laboratory equipped with special testing apparatus. The manufacture of bottles to the specifications of the company, their resistance to impact, the strains due to extremes of temperature and so on are all systematically gauged and tested.

Activated Carbon

ACTIVATED carbon produced by a new method is described by G. W. Stratton and D. E. Winkler, of the University of Kansas (*Ind. Eng. Chem.*, 1942, *34*, 5, p. 603). In their laboratories the carbon was produced by the combustion of hydrocarbons and chlorine in a water-cooled burner of seamless iron tubing. Both the chlorine and the hydrocarbons (propane and butane) employed were of commercial grade. In a typical run, butane was used at the rate of 500 ml. per min., and chlorine at the rate of 2500 ml. The carbon, as produced, was light and fluffy, and contained about 25 per cent. by weight of chlorinated derivatives, with hexachlorobenzene predominating. In activating the carbon by heating in the absence of air, it was found that best results were obtained by heating at 1000° C. for 90 minutes in a covered crucible placed in a cold muffle furnace. Rapid heating of the carbon was found to be undesirable, and higher temperatures decreased the activation. The carbon was proved to be superior in several respects to many other currently manufactured activated carbons, tests of iodine absorption, phenol absorption, coloured absorption, and gas absorption having been applied.

CONTAINERS FOR WAR-TIME TRANSPORT

Features that Provide for Maximum Length of Service

THE war-time transport of packed goods differs considerably from the normal. There is greater need to economise space, both floor space and stacked space (head room) having to be utilised to the full. Greater ease of handling is desirable in view of reduced labour availability; and the need to speed up loading and unloading becomes urgent so that vehicles may be fully utilised in active movement and also because loading and unloading may have to be done under difficult conditions, one of which is reduced artificial lighting at night. Increased speed of handling, together with the employment of inexperienced emergency staff, adds to the risk of damage in handling and (by faulty stacking) also during transit. In the matter of containers for the transport of chemical products during wartime, all these factors need attention.

Rough conditions of handling affect the useful life of any type of container, except perhaps those which have been made especially to meet the case. With reduced facilities of manufacture under war conditions there can be long delays in obtaining replacements, apart from the increased demand and scarcity of materials due to other war needs. Reduced transport space (especially shipping space) puts restrictions on the use of returnable containers, just as economy of materials of construction may be desirable; in consequence, both returnable and non-returnable types have distinct war-time uses. Increased strength to offset rougher handling, obtained at the expense of stronger materials, is not permissible owing to the shortage of essential materials of construction as well as increased weight in transport. Alternative materials which come to mind may not be practicable, because some of them (for instance, synthetic resin bases) are needed in other directions. Likewise, the prospective conservation of material by the use of lighter constructions may offer a higher risk of damage, with complete loss or, at best, deterioration of the product. To keep a container in service to the very limit of its useful life can be as much a false economy as the use of only non-returnable types, because such a container may fail at an unpropitious moment and cause loss or damage to a much-needed product, which in turn puts additional strain on manufacturing facilities. There are other points which could be mentioned, each having some undesirable consequence. The net result of our deliberations is that we are urged to make the fullest possible use of such containers as are available under present manufacturing facilities, giving particular attention to ease of handling, convenience of utilising available transport space, resistance offered against damage, and maximum useful life.

Strength of Steel Drums

For certain chemical products the steel drum is most essential as a means of packing for transport. Where non-returnable drums are indicated by restrictions on transport space the strength must not fall below a certain minimum which tests have determined. Increased strength, using lighter gauge metal, can be attained in some measure by the construction adopted, as by the provision of pressed corrugations on the side of the drum: such corrugations really offer the dual advantage of extra strength and ease of rolling. For liquid products there must be welded side seams; requirements for powders and solids are met by pressed seams.

The pressed side seam should preferably be a box seam. A hook seam, made by forming a hook at each end of the sheet and then interlocking and pressing, is simpler than the box seam, but is not nearly so serviceable, although it can be strengthened considerably by spot welding. The side of the drum is greatly strengthened by the corrugations already mentioned, the size and number of which will vary with the size of the drum, as these corrugations have to be expanded after the side seam has been formed. A double lock seam is preferable for securing the head of the drum to the side; this seam gives the tightest joint as well as the greatest corner strength in that there are five thicknesses of metal at the chime. Efficient manufacture of light-gauge metal drums of the non-returnable type is dependent on the perfection of the maker's machinery and the skill of his workmen. If badly formed, the box seam

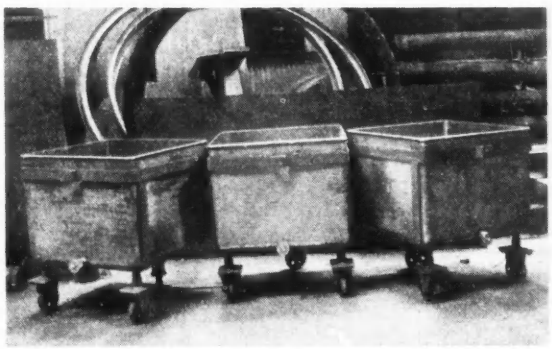


Fig. 1. Stainless steel portable containers (30" × 30" × 24"), specially constructed by Henry Balfour & Company, Ltd., for Genatosan, Ltd., Fine Chemical Department.

for the side and the double lock seam for the head can be notably poor as regards security for the contents of the drum.

It is almost impossible to apply these constructions so perfectly that the drums are water-tight and therefore suitable for the transport of liquids. The application of some filling composition to the exterior of the seams, or the coating of the drum internally at the seams, will increase the tightness, but for liquids in steel drums there is really no alternative to the drum which has welded side seams and welded heads.

For rough handling, small-sized non-returnable drums are preferable to those of larger size, irrespective of the weight of product which is to be put in them. On the other hand, the use of small drums increases handling time, but not necessarily handling difficulties: available transport space may not be utilised to the fullest in terms of net weight per cubic foot, although the available space is often better adapted to the task of stacking. The small drum, in comparison with a larger drum, suffers less damage from superimposed weight in stacking if its strength is adequate; this can be taken into consideration where two alternatives are offered and one gauge is a little thinner than the other at much advantage in price. Where a dry product can be packed in the molten state and allowed to solidify, it gives added support to the walls of the drum and will allow as much as 350 lb. weight to be packed per drum with the use of sheet steel no thicker than 28-gauge; this weight, under like conditions, would offer risks for a product in loose granular form or as a powder.

For liquids in non-returnable steel drums, the use of 18-gauge metal is adequately satisfactory for a capacity of 44 gallons, with the weight of the product equal to that of water, *i.e.*, a net weight of 440 lb. The permissible maximum for net weight of liquid for a drum of 44 gallons capacity is between 550 and 600 lb.; the danger point starts at 600 lb. Such drums are suitable for inflammable liquids, but if hazards are especially great the thickness of the sheet can be increased to 16-gauge. Head seams are commonly rendered water-tight by the use of some semi-plastic material (such as animal glue) to close any cracks left in bending the metal. Users of drums should assure themselves that the product to be packed will have no solvent action on any such filling material and so give rise to leakage; also that there is no contamination of the product. Actually, there is little risk of premature leakage unless the

drum has been dropped on its chime in such a manner that the seam has been caused to gape.

The development of special internal coatings for steel drums has widened their use for products which were hitherto likely to suffer damage by contamination or discoloration in contact with iron or steel. Such coatings must be continuous and free from defects if they are to serve their purpose effectively; double treatment eliminates the risk of pin-holes. The use of synthetic resin bases for such purposes has followed the shortage of zinc and tin. Available treatments should be tested in contact with the product which it is proposed to pack, because resistance to chemical action varies. The primary function of these internal coatings is that of protecting the product against damage by contamination or discoloration; the protection of the drum metal from damage by the contents is a secondary consideration which is in view in special cases only. The application of these compositions is mostly by spray-brush methods, and sometimes by slushing the interior of the drum, a suitable thinner being employed. The dried prime coating is baked at about 200° C. for about twenty minutes, and a second or top coating is then applied and baked in the same manner. The finished surface on the interior of the drum is hard and glass-like, and insoluble in a wide range of liquids which are normally regarded as having good solvent properties. Drums so treated can be used to carry alcohol, acetone, chloroform, turpentine, amyl acetate, amyl alcohol, toluol, tricresyl phosphate, butyl lactate, etc., and applied over a special lacquer base the coating offers satisfactory resistance to zinc chloride and other corrosives.

For light metal drums the galvanising of the interior to protect the contents against contamination greatly increases the cost, even though it is practicable. Air-dried synthetic resin coatings are unsatisfactory in comparison with coatings which have been baked on. The efficiency of the synthetic resin coatings largely depends on the cleanliness of the metal surface prior to application.

Returnable metal drums are of two types, the bilged and the straight-sided, both of which have their advantages. The arched construction, or barrel shape, of the bilged

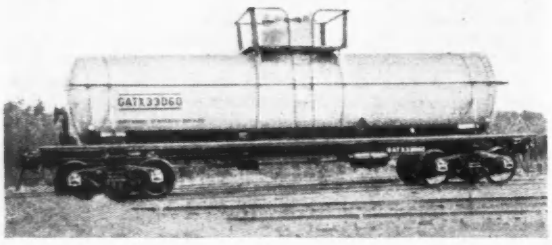


Fig. 2. All-welded tank car, constructed of 15-16 per cent. chrome steel, of the type used in America for transporting nitric acid in bulk.

type stiffens the sides of the drum and provides greater resistance to severe blows, and in consequence it offers a very long serviceable life. In addition, the bilged shape has the minimum contact with the ground and therefore is easily rolled, turned from one direction to another, and placed on end by the effort of one man. The tare weight of the bilged drum is usually less than that of a straight sided drum of the same capacity, but makers of the latter sometimes claim that they are able to use lighter metal, as the rolling hoops take up any shock and prevent it from reaching the body of the drum. In the straight-sided drum the rolling hoops certainly offer added strength, as well as provide a means of moving the drum about more easily. The task of placing such drums on end is facilitated by the fact that the hoops project 1 to 1½ inches from the periphery of the side, but the task of placing on end—weight for weight—is easier in the case of the bilged drum.

Whether or not the drum is to be used for liquids, it is best to have an all-welded construction, although many returnable drums are made in three pieces with the heads double-seamed and with use of semi-plastic material to fill the crevices. Rolling hoops on the straight-sided drums can be I-bar hoops or rolled-in expansions on the side of the drum. The latter often have the disadvantage of being too shallow to give easy movement in handling the drum. In addition, the resulting depressions on the interior of the drum prevent the complete drainage of the contents, and corrosive action may arise from small amounts of liquid left in an "empty" drum. With the I-bar hoop, structural strength may suffer if the welding by which the hoop is secured is not perfect; different methods are adopted for fixing these I-bar hoops, *e.g.*, by slight expansions in the sides of the drum made after the hoops are in position.

Treatment of "Empty" Containers

Returnable steel drums which cannot be completely emptied are unsatisfactory to the buyer of the product, but the owner of the drums should also realise that the residues of liquid can easily damage the interior and that this may prove costly in terms of capital outlay. Abuse by the user is commonly due to the general sturdy appearance and a misinterpretation of strength through lack of consideration that the drum is returnable again and again. All returnable drums, however, must be treated with great respect if they are to have a long life of service. Such drums are costly enough to warrant weather-proof storage, and though they are expected to withstand the changes of weather that come in course of transit, this does not imply that they can be left standing in water or mud while awaiting collection as empties.

External deterioration must be prevented by periodical scraping and painting. The interior of "empty" drums must be inspected and cleaned when they are returned for refilling. Special attention in the matter of inspection should be given to the spuds and plugs, which suffer much abuse and are generally the first part of the drum to show signs of failure. It is the joints between the head and the side that have to take most of the abuse in transport, and this damage is most difficult to rectify. Dents in the side can be removed by aid of air pressure at 10 to 45 lb./sq. inch, with the drum heads held secure to prevent bulging, but it is advised that this work be done by experienced men or by sending the drums to the maker, as lack of proper precautions may lead to serious accidents. Emphasis must be laid on the fact that it is not the nature of the liquid which materially affects the serviceable life of the returnable metal drum, for the quality of the steel can be varied to meet undue corrosion; abuse has to be guarded against by bringing this to the notice of all who handle the drums.

For dry powders and granular products the fibre drum has distinct advantages. It is much lighter in weight than a metal drum; it is impervious to the unfavourable conditions of atmosphere which are likely to arise in transport, especially transport by sea; and its strength can be increased to meet nearly all transport abuse. Large numbers of fibre drums are now used for dry pharmaceutical products which require the maximum protection against contamination and ingress of moisture. Greases, pastes, and other semi-solids are also successfully transported thus. The use of moisture-resisting material has the additional advantage of preventing vapour losses. For all types of fibre containers, drums and boxes alike, a considerable saving of paperboard is now effected by modifications which the makers have made in their specifications. Boxes to carry 90 lb. weight are commonly in use.

Slack wooden barrels, with tongued and grooved staves and steel-band hoops, are satisfactory packages for granular or powder products up to a net weight of 400 lb. The hoops are preferably galvanised to prevent corrosion, and must be fastened permanently by staples and not merely held in place by punching; careless handling under wartime conditions will demonstrate the soundness of this advice. Moreover, it is wise to see that the bilge of a slack barrel is not too great; barrels with high bilges are weak under rough handling, and there is little to be gained

(*Continued on page* 314.)

Welded Containers for Chemicals

Excellent Results of Ten Years' Test Conditions

TO those who supply containers to the chemical industry it is obvious that something more than the mere provision of tanks for storing and carrying products is required, for the varying action of chemicals on other materials gives rise to problems which are not easily solved. The advantages of welded containers for this and other purposes are pointed out in reports which THE CHEMICAL AGE has received from industrial concerns. In the riveted tank it is, of course, necessary to cut out the rivet holes which, it is contended, weakens the plate and cuts down the efficiency of the original metal. In a welded tank an efficiency of 100 per cent. is claimed for the joint which is often actually stronger than the original plate itself.

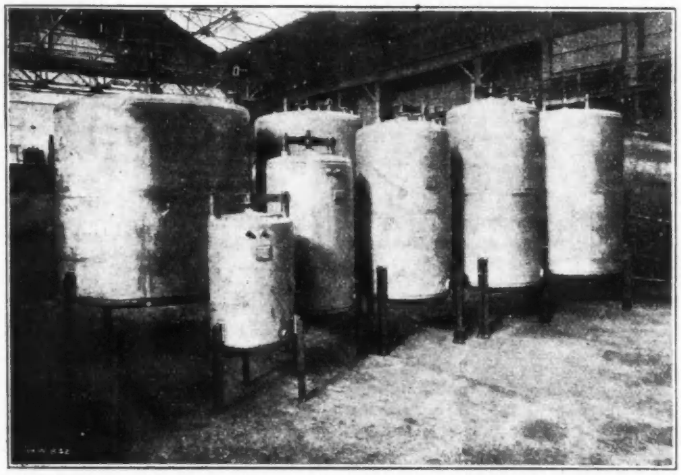


Fig. 1. All-welded containers, of varying capacity, for pharmaceutical products.

Whereas a riveted tank is not water-tight until it is galvanised, the welded container does not depend upon this process to seal up leakages, and is thus enabled to withstand considerably more rough treatment without risking leakage. Riveted tanks, too, suffer the disadvantage that it is impossible entirely to eliminate the risk of acid percolation between the two surfaces during the pickling process with the result that after completion there may be little pockets between the plates in which acid still remains. This will tend to eat through the plate.

With a welded tank this does not occur and consequently its durability is increased. In this respect it is interesting to record the remarks of the chief engineer of a large firm of manufacturing chemists regarding the behaviour of stainless steel welded containers supplied to his firm ten years ago by Robert Jenkins and Co., Ltd., of Rotherham. In spite of the varied nature of the material stored in these tanks and frequent testing, no case of intercrystalline corrosion has, so far, been detected. Products stored in the tanks have proved to be very satisfactory and the tanks are still good for what would appear to be an indefinitely long useful life.

"Staybrite" Stainless Steel

The tanks, some of which are shown in Fig. 1, numbered 102 in all and were supplied for use in the storage of pharmaceutical products of a very varied nature. They range in size from 50 to 1000 gallons capacity and were designed for a working pressure of 15 lb. per square inch. They are an example of one of the earliest uses of the stabilised 18/8 chromium nickel austenitic stainless steel containing tungsten and titanium, known as "Staybrite" F.D.P. and manufactured by Messrs. Firth-Vickers Stainless Steels, Ltd. The thickness of the material used varied from $\frac{1}{8}$ to 5/16 in. and the tanks were constructed by electric arc welding using Murex F.D.P. electrodes, no subsequent heat treatment being given to the tanks. The material used was in the descaled condition and special care was given to the finish of the interior of the tanks, all welds being ground up and the surface mechanically and chemically cleaned. The tanks were constructed to exacting specifications issued by the purchaser both as regards materials and workmanship.

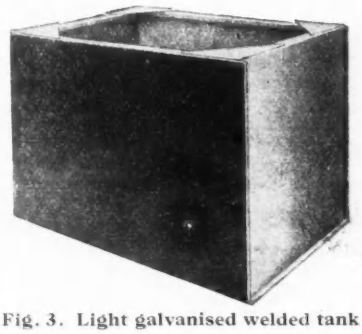


Fig. 3. Light galvanised welded tank.

The products stored in these tanks cover a large number of pharmaceutical preparations ranging from 1000 gallon tanks for the storage of Lysol down to 50 gallons tanks for the storage of various alcoholic tinctures. Such large-scale storage had never before been attempted and the purchasers devoted over a year's research work to the testing of numerous steels and the action of over 100 of their products on the austenitic stainless steels. All the products stored in these tanks have to satisfy exacting tests for the presence of metals. It is essential also that they shall remain active and show no signs of deterioration.

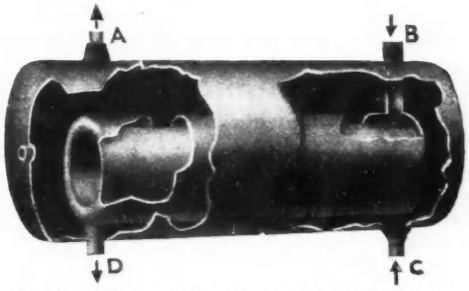


Fig. 2. Galvanised indirect cylinder for hot-water supply, in horizontal position.

Another product of Robert Jenkins and Company is an all-welded galvanised indirect cylinder (Fig. 2) for hot water supply. The principal advantage of this type of cylinder is stated to be that it can be connected up to any heating installation without risk of an accumulation of deposit in the boiler, and cleaning out of the boiler is needed no more than with a boiler used for heating apparatus alone. The hot water in the boiler is never drawn off, and the only new water introduced into the boiler is the occasional replenishment to replace losses by evaporation. The hot water drawn off for domestic purposes never comes into contact with the boiler. These cylinders may be installed in either the horizontal or vertical position, and are made with capacities varying from 50 to 300 gallons.

From the same firm comes news that extensions and improvements have been made in the production of its light galvanised tanks (Fig. 3) manufacture of which was started by the company seven years ago.

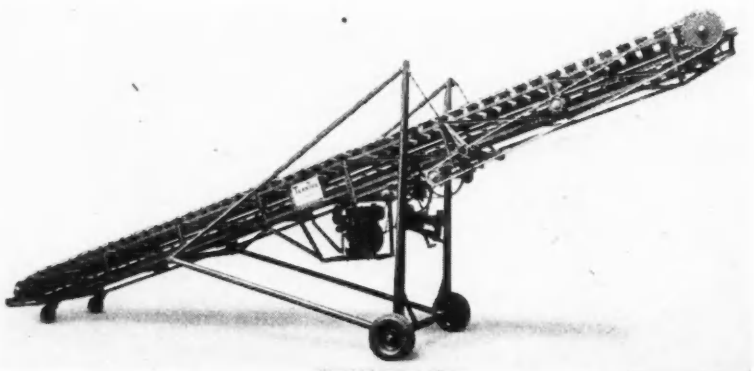
A Handy Portable Conveyor

Lightness Achieved without Loss of Strength

FOR general handling of material in bulk the light portable conveyor has for long been considered a standard equipment, although in this country at any rate there is still a wide field open for development. The "TeanTee" Portable Conveyor has been designed with extreme portability and handiness always in view. The total weight of the standard model, which has a 14 in. belt working with 25 ft. drum centres, is less than 14 cwt. Handiness is assisted too by the 16 in. by 4 in. pneumatic tyres which are standard equipment; on anything like a smooth and level floor, two men can handle the machine with ease. The accompanying illustration shows a special design of slat conveyor for loading packages weighing up to 2 cwt. to heights varying from 4 to 12 ft. The makers have prepared many special designs of this sort, to suit customers' special requirements.

Nothing of the necessary strength and general robustness has been sacrificed to obtain lightness; the result has been achieved by careful design and choice of components. The frame is built up of light angle sections braced as necessary for strength; the undercarriage is constructed of steel tubes; but it is only by the intelligent use of electric welding that these light elements are combined into the strong and efficient frame they form. The choice of power unit too has helped. The engine used is the famous "Petter" air-cooled industrial unit. The advantages of this are many. In the first place, lightness; the engine weighs only 172 lb., against 1 cwt. more for water-cooled units of similar power output. It is also remarkably free from vibration, a most desirable feature on any portable plant. The advantage arising from the elimination of frost risk in winter is too obvious to need stressing. There seems to be no corresponding disadvantage with air-cooling, as the engine will go on delivering its full power all day long in the hottest of weather.

The power is transmitted throughout by means of moulded rubber V-ropes. This modern flexible form of drive has been found to lend itself excellently to this service; it requires no lubrication or other attention, and when the belts do eventually wear out they are cheaply and easily renewed. Both shafts and idlers are fitted throughout with ball bearings as standard. This is a feature often charged as an expensive extra, but it has been incorporated as standard because of the great advantages in ease of starting and running and the saving in power, lubrication, etc.



Slat-type portable conveyor

The design lends itself particularly easily to modifications such as altered discharge heights, and the makers are always glad to design special variations of loading and stacking conveyors to suit the needs of a large variety of trades. The manufacturers, T. and T. Works, Ltd., Billesdon, Leicester, are always pleased to give personal attention to the conveying and handling problems of the chemical and allied industries.

Wood for Chemical Containers

Pre-War Workmanship Standard Maintained

THE interesting feature of the present construction of vats and wooden tanks appears not so much in any new technical development, but rather in the converse, namely, that wooden vessels for chemicals are still being constructed up to pre-war standards, both of workmanship and quality, and seasoning of timber, despite the advanced stage of the war and restrictions involved by the acute shortage of timber.

Nevertheless, although there are still some stocks left of the usual vatmaking timbers, such as pitch pine, a gradual change over is being effected, for obvious reasons, to English timbers. These consist primarily of oak and larch. There is, of course, nothing experimental about oak, which has been in use as a vat timber from time immemorial, and if difficulties of timber importation continue much longer, oak will presumably become the main timber for chemical vessels. The use of larch is only beginning, but this timber is considered to be a useful potential successor to pitch pine.

The other aspect of vatmaking which deserves comment is the exceptional variety of essential purposes for which wooden vats are used in wartime. Those not familiar with the trade generally suppose it to be solely concerned with providing brewers with vessels for beer, and would, perhaps, be surprised to learn that the vast munition factories contain rows of vats for boiling gun-cotton, and that the other war uses of vats are so various that there is hardly a single Government department which does not require them either directly or indirectly. From the reader's point of view it is unfortunate that the most interesting of these purposes are of a secret character and therefore unpublishable.

Containers for War-Time Transport

(*Continued from page 312.*)

in the additional capacity offered. With paper shortage there is some inclination to think that the paper liner for a slack wooden barrel is rather a matter of internal adornment than an essential part of the complete package: this is another example of false war economy, which will soon become evident in view of the poor quality of some of the paper that is being made and offered for this distinctly important use.

Multi-wall paper bags offer good service for carrying a much larger number of granular and powdery chemical products than is generally realised. Such bags are satisfactory for a net weight of 300 to 350 lb., using six-ply material, with one ply or more suitably treated for resistance against moisture; the usual moisture-resisting base is asphalt. The chief disadvantage of the paper bag for wartime use is damage by careless handling and inexperienced stacking. Vehicles used for transport should have interior protection against the damage that can come from bolts and strengthening-irons used in construction.

CHEMICAL STONEWARE CONTAINERS

Recent Developments

by DESMOND EYLES

BRITISH chemical stoneware plant is made from high-grade pottery clays of which this country fortunately possesses abundant deposits. In these days, when steel, aluminium, tin, rubber, and many other constructional materials must be strictly conserved for the most vital war-time needs, chemical stoneware is finding ever-increasing applications in the manufacture and storage of chemicals.

Tanks, vats, pans, storage jars and similar containers are available in chemical stoneware in a great variety of shapes and sizes, ranging from small one-pint jugs and jars up to large vessels of several hundred gallons capacity. These containers are used for the processing and storage not only of acids and other corrosive liquids, but also of foodstuffs, beverages, perfumes, essences, pharmaceuticals, dyes, and numerous other products. Although the unglazed body of the ware itself is proof against all acids in all concentrations (except hydrofluoric acid), a smooth glaze is generally applied to the inner and outer surfaces to facilitate cleaning.

Modern chemical stoneware has a compression strength comparable with that of grey cast iron. Tensile strength, resistance to impact, and resistance to abrasion have also been greatly increased in recent years and if installed and handled with reasonable care stoneware equipment will give countless years of trouble-free service. The flexibility of design which stoneware affords is another valuable

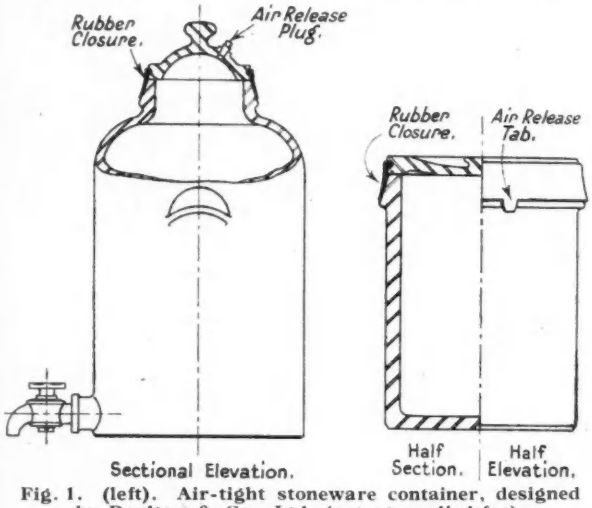


Fig. 1. (left). Air-tight stoneware container, designed by Doulton & Co., Ltd. (patent applied for).

Fig. 2. (right). Large air-tight storage jar, by Doulton & Co., Ltd. (patent applied for), showing the small hole in the cover, with air-releasing device.

property. This is due both to the plastic nature of the clays from which the ware is made and to the variety of processes which may be employed in manufacture, including "throwing" on the potter's wheel, casting, moulding, die-pressing, and extruding, according to the nature of the article.

In addition to the ordinary cream and brown glazed stoneware, a special white chemical stoneware is available This is made from an entirely iron-free body of a semi-porcellaneous nature, and covered with a smooth white glaze. It is particularly suitable for use in the processing and storage of food products, essences, perfumes, and drugs and pharmaceuticals, where absolute hygiene is an essential factor at all stages of production.

Chemical stoneware storage jars are often provided with vacuum-tight covers of the same material with suitable inlets for siphon pipes, and outlets fitted with ground-in stoneware cocks may be arranged in any desired position. In large works, a battery of storage jars is often installed, the separate vessels being linked up by a system of siphon pipes to a special delivery vessel. Such a battery works as a single unit, under siphonic action, and the level of

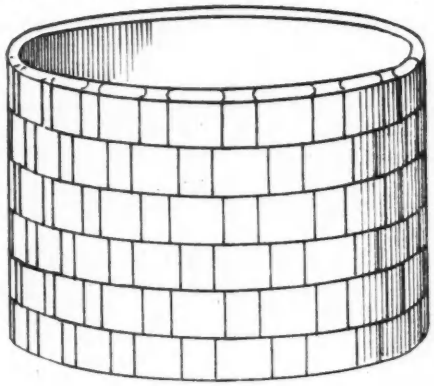


Fig. 3. Stoneware container or silo constructed from special blocks designed by Doulton & Co. Ltd. (provisional patent specification lodged).

the liquid in all the jars remains constant. Illustrations of a typical installation have already appeared in THE CHEMICAL AGE (1941, *44*, 1148, p. 366).

A particularly interesting development of the last twelve months is an air-tight container (Fig. 1) designed by Doulton and Co., Limited, for which an application for a patent has been made. The container is fitted with a rubber closure which has an air-release tab, enabling the cover to be replaced and resealed any number of times. The important part of the design is the conically shaped seating at the top of the vessel which causes the rubber sealing device to expand and grip the top when the lid is placed in position, the seal being maintained by atmos-

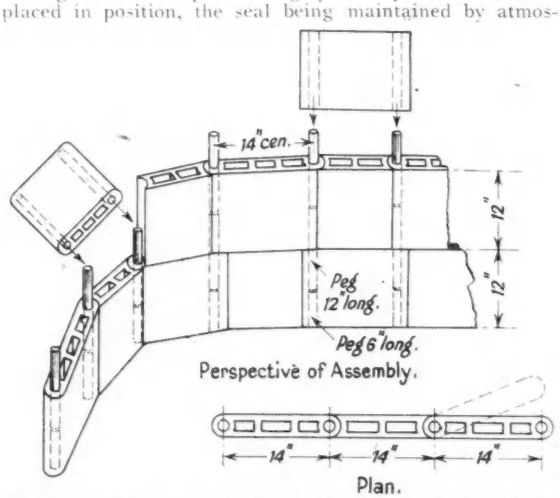


Fig. 4. Method of erecting the stoneware blocks shown in Fig. 3.

pheric pressure. The rubber ring fits snugly into a groove on the cover. Containers embodying this device can be made in capacities from a few ounces up to several hun-

dred gallons. In the case of the larger store jars, a small hole, fitted with a rubber bung or other device for releasing the air, is incorporated in the cover, as shown in Fig. 2.

The grip of the rubber ring is so strong that even jars of large capacity, when full of liquid, can be suspended by the knob on the cover. Unfortunately, owing to the present rubber situation, these jars can now be supplied only when an official permit is obtained for the rubber. The design has evoked considerable interest on the part of those manufacturers to whom it has been shown and there will undoubtedly be a great demand for these containers after the war.

Another novel invention of the same well-known firm, for which a Provisional Specification has been lodged, consists of special stoneware blocks for building wall structures suitable for silos, tanks, crystallising compartments, and other purposes. These containers can be used for the storage of cattle food, grain, crystals, powders, dry chemicals, and similar materials. For storing acids and other corrosive liquids the blocks can be jointed and reinforced with an acid-resisting cement and should it be desired to give added strength to the structures, the hollow parts of the blocks may be filled with liquid concrete or cement.

The essential features of these blocks will be readily seen from Figs. 3 and 4. The container is built up from two basic types of stoneware blocks which fit together and are locked in place by means of pins of the same material. No special skill is called for in erection and containers of almost any shape or diameter can be constructed from the standard blocks. These containers are suitable for erection in any desired position, either indoors or out-of-doors, as the material is resistant to both acid and weather. Apart from the construction of storage containers, other possible uses for these blocks are the speedy erection of walls and temporary buildings, including stands and kiosks at exhibitions. The design is at the same time so novel and yet so simple that as time goes on many other applications will almost certainly suggest themselves.

Construction Note for Circular Tanks*

Jig for Locating Small Flanged Branches

THE fabrication and erection of all kinds of tanks and pressure vessels is a branch of engineering in which the use of welding is fast becoming predominant because of the particular advantages which it offers to this type of work. For, apart from the saving in weight and in costs, the use of the process ensures that the joints remain perfectly tight and, in addition, corrosion—which normally occurs in the neighbourhood of riveted seams—is considerably reduced. Maintenance costs are, in consequence cut down materially, and the benefits of welding are thus felt both by the management and the works.

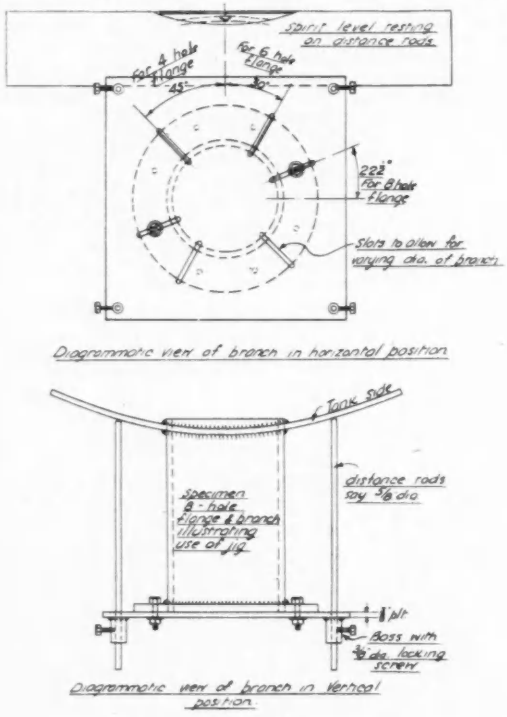


Fig. 1.

* From *The Welder*, 1941, p. 264, by courtesy of Murex Welding Processes, Ltd., Waltham Cross, Herts.

Nevertheless, in common with other methods of fabrication, the use of welding in tanks is attended by works problems of its own, and its employment by the uninitiated may be apt to present some unforeseen difficulties. There is, for example, the question of distortion which usually confronts the beginner, and which, incidentally, is not peculiar to welding alone: the riveting, in similar circumstances, of a circumferential seam of, say, a boiler is a good example of its probable occurrence in the parallel field of riveted fabrication.

Another instance, which is usually less heard of, but which nevertheless is alway present, is the welding in of small branch pipes to the sides of a cylindrical tank or vessel—or, rather, the tacking of them into position prior to welding. This operation at first sight appears to be extraordinarily simple, but anyone who has tried to hold a branch in position while it was being tacked by the welder will appreciate that it is far more easily drawn on paper than done in the field. All difficulty can, however, be eliminated by the use of the simple jig shown herewith, and our thanks are due to Mr. J. E. Hawksley of Messrs. Newton Chambers & Co., Ltd., Thorncliffe Ironworks, Sheffield, for bringing this matter to our notice. We trust that it will not only prove of interest to our readers, but will also result in a saving of man-hours—the importance of which, from the point of view of the national effort, cannot be over-emphasised.

The jig, as will be seen, is extremely simple both to make and to use, and consists of a flat plate and four distance rods the length of which can be adjusted by means of four locking screws. The plate is fitted with slots radiating from the centre and set at regular equal angles depending on the number of holes in the branch flange to be fixed. Thus if four bolt flanges are being used, the angles between the slots will be 90°, if six bolts 60°, if eight bolts 45°, and so on, though normally only two bolt-holes need be used to hold any branch to the jig. The height of the branches which can be handled by the jig is, of course, purely a function of the length of the distance rods, which can be made long enough to suit most sizes in general use.

The employment of this simple device ensures maximum accuracy of location with the least trouble, and a jig of this kind used by Messrs. Newton Chambers & Co., Ltd., can accommodate branches from 2 in. to 12 in. bore with four, six, eight or twelve holes. It is used for tacking only and, in the case of a horizontal branch where holes must be accurately off centre, a spirit level is laid across the top distance rods as shown in the illustration.

The Cleansing of Oil Containers

Efficient Reconditioning Process

by KENNETH S. LOW

A SHORT time ago attention was called to an apparatus designed to deal effectively with problems related to the removal of residual oily and other viscous products, under economic conditions, from all classes of containers ranging from tank wagons and barges to paint drums. In the interim a number of improvements have been incorporated, which have been embodied in additional patents which cover the "Gasolvator." Efficient cleansing of containers and appliances used for the transport and storage generally of materials of a hydrocarbon constitution, has tended to be a somewhat haphazard, tedious, and often unprofitable operation, resorted to only with permanent and costly vessels. In present circumstances, however, the cleaning and recovering for further use of a host of smaller and hitherto non-returnable containers, has become not only of economic, but of national significance. Yet great as the necessity may be, if such problems are not systematically handled by means of a standardised and proved process, the final object may be found to have been defeated. For example, the burning out of drums and various appliances may be found to have removed the primary contamination, only to leave carbon deposits of a more refractory nature as a potential and cumulative future contaminator. Moreover, considerable labour and fuel may be involved which sometimes reaches the necessity of cutting out and re-welding areas to make possible the removal of deposits and crusts, or alternatively costly solvents with large percentage loss have been used, so that only dire necessity, as balanced against the procurability of materials and labour, could decide the issue whether to attempt to re-condition the vessel or to discard it as mere scrap metal.

The general principle of the appliance under review consists of the direction of a vaporised solvent at high velocity, but at relatively low pressure, into the vessel under treatment with subsequent condensation and recovery of solvents for return to the vaporising unit. Improvements related to high factors of efficiency and recovery have increased flexibility and simplicity of control, which enable a single unit to adapt itself readily to treatment either of a large vessel or of a series of small containers. One of the chief features in the improved plant consists of a plurality of compartments within the body of the unit having one or more walls in common, to which compartments heat is supplied so that vapour is produced. Provision of a common wall facilitates the transfer of heat from a chamber in immediate use to one in preparation for use, so that when one compartment is exhausted another which has meanwhile been filled is heated and ready for use. Thus continuity and economy are ensured.

Simplicity and Economy

The advantages and uses of the Gasolvator include mobility, compactness, simplicity, rapidity, and economy in application to the most modern and scientific methods of cleaning, to the degreasing and gas-freeing of all classes of vessels, such as tanks, barges, bunkers, oil-immersed transformers, pipelines, valves, and a host of smaller drums, barrels and containers used for conveyance or storage of heavy, light, or lubricating oils, tar, bitumen, and paint. Residual films and deposits are removed by appropriate solvent action as opposed to any conversion to carbonaceous material which may require mechanical abrasion for removal. The action is, therefore, entirely non-destructive and, according to the degree of cleanliness required, may be carried to complete effectiveness. In operation the Gasolvator is charged with an appropriate commercial liquid solvent which is heated by steam applied to the internal coils, until the necessary pressure of solvent vapour is generated. This is then conveyed through a suitable pipeline to the vessel to be cleaned. Owing to substantial pressure in the Gasolvator and relatively low pressure within the container, the solvent is directed with considerable velocity to all sides which enables it to penetrate any deposits on walls and seams and allows of subsequent saturation, followed by condensation of a solution, suspension, or emulsion of the materials to be removed. The process may be repeated until all traces are removed, but as each release of solvent is in effect a "shot," the amount of time involved is small. The resultant sludge is finally drawn off and passed through a filter cloth, from which the filtrate after distillation is led to the chambers of the Gasolvator for further use.

The Gasolvator is a self-contained mobile unit requiring no auxiliary equipment other than a supply of steam, while its construction makes it entirely safe and simple to operate. Experience has shown that attempted cleansings, which by other methods have taken hours or even days to reach a very indifferent result, can be efficiently carried out in a matter of minutes. As no preliminary cleaning or heating is necessary, no mechanical or physical damage such as may be caused by undue expansion can occur. Moreover, no dangerous or explosive gases remain from the special solvents used by Gasolvator treatment; the vessels have merely to be vented by removal of the pipeline, or in some cases air pressure may be momentarily introduced to free the vessel completely from any lingering vapour.

Synthetic Flavours and Oils

A Big War-Time Industry in Germany

THE war-time shortage of imported essential oils and flavouring materials has given rise in Germany to a great increase in the production of synthetic materials for the foodstuffs industry. The annual production of these essences is estimated by the *Frankfurter Zeitung* at over 80 million marks. About 100 firms supply 90 per cent. of the entire output, and the fifteen largest firms produce no less than half the total production. Not only are synthetic flavourings used in place of imported spices, but special products have been developed to add a flavour of butter to cakes and toffees made without it, and the distillers of alcoholic spirits who have largely switched over to non-alcoholic drinks also buy large quantities of various essences. Synthetic benzaldehyde is used extensively in place of the oil of bitter almonds obtained from peach and apricot stones, while a substitute for cinnamon is based on cinnamic aldehyde. In addition, however, there are a large number of less satisfactory substitutes, which were brought under control by an order issued late last year. Most of the artificial materials used to flavour sweets and drinks are, however, treated with suspicion by the public.

WORLD PRODUCTION OF SYNTHETIC FIBRE

Preliminary estimates of world production of rayon and staple fibre show a total for 1941 of 2,503,500,000 lb. against 2,340,000,000 lb. in 1940 and 2,151,200,000 lb. in 1939. Estimates (some of which are necessarily provisional) reveal the following position in the leading countries (in million lb.):—

	1941	1940	1939
Germany	725	670	555
United States	573	471	384
Japan	500	510	535
Italy	375	375	290

Production in the United Kingdom apparently fell under the concentration scheme, but on the other hand, there was an increase in both Argentina and Brazil.

Personal Notes

MR. WALTER MASON, of W. Mason & Co., chemical manufacturers, Borough Chemical Works, Accrington, has been appointed a magistrate on the local bench.

MR. LEONARD J. DUSSEK has been appointed chairman of Dussek Bros. & Co., Ltd., in succession to the late Mr. A. S. Dussek.

DR. WILLIAM MAITLAND, head of the Chemistry Department of Robert Gordon's College, Aberdeen, for 29 years, received a presentation from his colleagues on June 19 on the occasion of his retirement.

DR. PAUL DYER MERICA, vice-president of the International Nickel Co. of Canada, has been awarded the Franklin Medal of the Franklin Institute for his discoveries of the uses of a variety of alloys for commercial purposes and for his development of the principle of precipitation hardening.

The following were appointed, at the annual general meeting held on June 18, to serve as the officers of the British Chemical Plant Manufacturers' Association for the ensuing year: Chairman, Dr. G. E. FOXWELL (Clayton, Son & Co., Ltd.); Vice-chairman, Mr. K. FRASER (W. J. Fraser & Co., Ltd.); hon. treasurer, Mr. W. S. KNIGHT (Kestner Evaporator & Engineering Co., Ltd.).

Obituary

MR. T. B. SISSONS, chairman of Sissons Bros. and Co., Ltd., paint, varnish, and disinfectant manufacturers, Hull, died on his way to his office on June 22, 1942. Mr. Sissons was connected with national and local paint trade organisations.

MR. HUMPHREY MORTEN, of Imperial Chemical Industries, Ltd., Calcutta, died on June 22 from injuries received during the hold-up of the Kalka-Simla train by armed bandits. The driver and four British officers were also killed, and another officer was injured.

MR. STANLEY KENNEDY NORTH, who died in London on June 16, was one of the leading exponents of a little-known branch of chemistry—the conservation of paintings. An artist and craftsman, as well as a scientist, he combined to a remarkable degree a knowledge of chemical and physical methods with a love of art, and his skill in temperature and pressure control far outdistanced that of many of his more strictly scientific contemporaries.

MR WILLIAM ALFRED BENTON, who was a Fellow of the Chemical Society from 1916 to 1935, died suddenly on June 19, at his home in Handsworth, Birmingham, at the age of 71. Mr. Benton was an inventor with many patents to his credit including a specific gravity balance. In 1901 he joined W. and T. Avery, Ltd., as head of the firms' research department. He was an ex-president of the Birmingham Metallurgical Society—receiving the society's silver medal for services rendered—and at the time of his death was a Fellow of the Royal Photographic Society.

MR. C. STUART VARCOE, who died recently at Golant, Cornwall, aged 74, was an outstanding figure in the china clay industry. For 30 years Mr. Varcoe was managing director of Messrs. William Varcoe & Sons, of St. Austell, retiring in 1928. Soon after this, however, he acquired the Par Flour Mills, of which he became chairman, and which have been converted into a large milling concern for the development of the felspar industry (which Mr. Varcoe had introduced many years previously) under the title of the Cornwall Mills, Ltd. As recently as 1939, Mr. Varcoe extended his interests still further by the inclusion of the Yate Mills Co., Ltd., at Yate, Glos., for the production of heavy chemicals.

New Control Orders

Chrome, Magnesite and Wolfram

THE Minister of Supply has made the Control of Chrome, Magnesite and Wolfram (No. 3) Order, 1942, which came into operation on June 19, and extends the provisions of the Nos. 1 and 2 Orders by making the acquisition of refractory dolomite (including bricks, cements, and compositions) subject to licence. A Direction operative from the same date excludes from the licensing procedure any refractory dolomite and any refractory dolomite which has been mixed with a bonding material, but which has not been further processed or manufactured. Licensing at present is, in effect, limited mainly to dolomite bricks and the various stabilised dolomite clinkers. The new Direction also terminates the exception of chromium metal from licensing made by the Control of Chrome, Magnesite and Wolfram (No. 1) Order, 1940, Direction No. 1, and the acquisition of chromium metal is consequently now subject to licence. The Order and Direction are published as one document (S.R. & O. 1942, Nos. and O. 1942, No. 1188 came into force on June 24.

Iron and Steel

The Minister of Supply has issued the Control of Iron and Steel (No. 22) Order, 1942, which amends the price schedule of the No. 15 Order in so far as cinder and scale for use in blast-furnaces and steel furnaces are concerned. The principal alteration is an increase in the prices of cinder and scale for use in steel furnaces. The Order (S.R. and O. 1944, No. 1188) came into force on June 24.

Hydrogenation of Oils

Rate of Reaction Examined

HYDROGENATION of sunflower oil is carried out in Russia on a large scale. G. M. Zhabrova (*J. Phys. Chem. Russ., 14,* 1271) has investigated the speed of this process, and the information offered in her paper can be applied to the hydrogenation of other oils and fats. The experiments were performed by suspending nickel formate in oil and heating the whole in a hydrogen current. The fraction (f) of the unsaturated oil remaining after t min. of hydrogenation was determined every few minutes. It was found that the reaction was of the first order, *i.e.*, $\log_e f = -kt$, k being the constant coefficient. For a given catalyst and a given oil the coefficient k depends chiefly on three factors: the amount of catalyst, the stirring, and the temperature. When the amount (a) of nickel increases from 0.015 per cent. to 0.50 per cent. k also increases, but less rapidly; k is proportional to $a^{0.8}$. When the number of revolutions of the stirrer increases from 1000 to 15,000 per minute k increases in the ratio 3.5 : 1. If the stirring is done only by the bubbling through of hydrogen, k rises eightfold when the speed of hydrogen rises tenfold. Stirring has a large effect on the temperature coefficient of k. If the intensity of stirring is kept low, the rate of hydrogenation increases with temperature regularly and considerably within the whole examined range of 150°-240° C. With intensive stirring this increase of k is observed only below 200° C., while at higher temperatures the temperature coefficient is very small.

All these results can, according to Zhabrova, be accounted for if the low solubility of hydrogen in oil is considered. The reaction takes place chiefly at the surface of the hydrogen bubbles, especially when these bubbles come in contact with the particles of catalyst. Since the probability of such a contact is proportional to the surface area of the catalyst which, in its turn, is proportional to the volume of the catalyst in the ratio 2/3, the reaction rate is roughly proportional to $a^{0.7}$, the experimental exponent being 0.8. Stirring augments the total surface area of the bubbles and the time they spend in the oil.

The effect of the surface area has been investigated also by passing hydrogen through a glass powder membrane which broke down large hydrogen bubbles into hundreds of microscopic bubbles. The magnitude of k was considerably raised by this device. The high temperature coefficient at low temperatures and in the absence of stirring is the real temperature coefficient of the hydrogenation, whereas the low coefficients show that at high temperatures and in undisturbed oil the rate of reaction is determined by the diffusion.

Metal Drum Repairs

Cleaning Process Makes Welding Safer

THE elimination of danger to the greatest possible extent in the use of the tools of industry is a process which goes on continuously side by side with the shaping of ever more efficient machines. It plays a vital part in technical progress, and members of an industry always welcome suggestions for the smoother and safer working of their plant. From the National Safety Council of Chicago comes an important contribution to this work in the form of a suggested procedure for cleaning and testing metal drums (of 55 gallons capacity or less) which have contained volatile or inflammable liquids, before making welding repairs.

It is evident that when a welder applies his torch to a drum that has not been thoroughly cleaned and made free of vapour he stands the risk of causing an explosion or flash fire. Many accidents of this kind have resulted from the employment of methods which do not provide for the steaming, cleaning, or washing of a drum before starting work. Not only, however, are many of the processes used lacking in efficiency through lack of care, but sometimes methods include wasteful precautions which involve considerable time and expense without having any effect on the results. It is clear, then, that a scientifically worked out method for cleaning and testing is well worthy of careful study.

The sort of accident which might occur if proper precautions are not taken is illustrated by the report of a worker who attempted to use a torch on a drum that had not been freed of volatile vapours. The head of the drum blew out, inflicting severe injuries which included numerous facial lacerations, injury to the eye, severe concussion and shock, compound fracture of the left arm, and numerous body bruises.

Actual practice tests of the National Safety Council's method showed that most of the drums were free from vapour after treatment, and the few which showed vapour still present were well below the lower explosive limit. To make doubly certain that risk has been eliminated, a vapour test should be made with a direct-reading meter just prior to the application of a torch by the welder.

First of all, it is suggested that all plugs be removed from the drum. The inside should be inspected for rags and other debris, no restriction being left that would interfere with the free draining of the drum. After this preliminary work, place the drum on a steam rack with the bung hole at low point and allow it to drain for not less than five minutes. The drum should then have steam applied to it for at least ten minutes. Drums which have contained shellac, turpentine, or similar materials require longer steaming to remove residue and irritating fumes.

The drum should be allowed to cool for at least fifteen minutes after removal from the steam rack and then taken to the drum washer for cleaning with a soda ash or mild caustic soda solution. Pieces of brass chain inserted with the solution will aid in loosening caked sediment. The next stage is the de-denting of the drum by filling it with water under a pressure of 60-70 lb. and striking it with a hammer. Any leaks detected should be marked at once for repair. The drum can now be drained and removed to the welding department. Before the actual welding repairs are made, the drum should be placed in a repair frame to hold it in place with all openings and seams directed away from the worker. While the welding is being done ample ventilation for the fumes should be provided.

It is now time to remove the drum to the water vat to test for leaks, an air-pressure maximum of 10 lb. being stipulated. Regulators and safety valves should be provided in air-line connections. A minimum pressure should be used for testing which in no case exceeds the specified limits. After the test, a defective drum will, of course, be returned to the welding department.

DETECTION OF BIVALENT MERCURY

G. Veselskaya (*J. Appl. Chem. Russ.*, 1941, *14*, 423) introduces phloroglucine (1, 3, 5-trihydroxy-benzene) as a reagent for the bivalent mercury ion. Mixing of a phloroglucine solution acidified with nitric acid with 1 c.c. of 0.001 *N* mercuric nitrate produces a turbidity due to formation of the compound $C_6H_6O_3$, HgO which is insoluble in water and alcohol. No precipitate is formed with the salts of Na, K, NH_4, Ca, Zn, Sr, Ba, Cd, Mg, Cu (cupric), Pb (bivalent), Ag, Ni, Co, Cr, Al, Sb (trivalent), UO_2, Mn, Ti (trivalent), or Bi. No precipitate forms also if the solution contains ions of Cl, Br, I, CN, or SCN. In this case to 2 c.c. of the solution 5-10 drops of 1*N* sodium chloride are added, and the interfering ions are precipitated with an excess of silver nitrate. The filtrate is then tested with phoroglucine. If the mercury compound is insoluble in water and dilute acids, it is warmed with a mixture of concentrated nitric and sulphuric acid, the extract is diluted with water, and tested with phloroglucine.

Details of a standard type of electric furnace produced to meet general requirements for a number of purposes, and possessing a remarkable high thermal efficiency, are given in a leaflet recently published by the manufacturers, JOHNSON, MATTHEY AND CO., LTD., 73/83 Hatton Garden, London, E.C.1. This electric furnace, the J.M.C. Type T, consisting essentially of a high temperature refractory tube, wound with a precious metal heating element and enclosed in a heat-insulated case, is particularly suitable for determinations of sulphur and carbon in steels. The special advantages of the platinum alloy used in the heating element lies in its lower temperature coefficient of resistance, as compared with pure platinum.

REGENERATION OF NICKEL CATALYST

A very active nickel catalyst is obtained by dissolving nickel-aluminium alloys in concentrated caustic soda. It is used with advantage for hydrogenation of aldehydes. It is, however, so easily poisoned by the reaction products that in some instances 1 lb. of the catalyst has to be discarded for each 7-10 lb. of the alcohol produced. I. Sivkov and B. Migulin (*J. Appl. Chem. Russ.*, 1941, *14*, 400) have investigated the possibility of regenerating the poisoned catalyst. When œnanthol (or another aldehyde) is hydrogenated in ethyl alcohol in the presence of nickel catalyst, a part of the latter is suspended in the liquid as a fine dust, and another part forms relatively coarse grains. The finely dispersed part is found to be much less active than the coarse particles. After a few catalytic reactions the activity of the coarse particles declines likewise; the rate of decay can be lowered by washing the catalyst with ethyl alcohol or acetic acid, and a more radical improvement is achieved by adding some fresh catalyst to the "fatigued" one. But even that improvement is merely temporary. To restore the catalytic activity completely the "worn-out" catalyst is heated with aluminium in a graphite crucible. From 0.65 kg. of catalyst and 2.5 kg. of aluminium, 2.28 kg. of alloy containing 27 per cent. of nickel have been obtained. Its dissolution in concentrated NaOH gave 0.57 kg. of active nickel catalyst.

A new catalogue, M.D.141, describing the latest developments in their "Enispeed" Lathe and Machine Drives, which has recently been produced by Messrs. CROFTS (ENGINEERS), LTD., Thornbury, Bradford, lists a full range of complete self-contained motor drives for all classes of machinery.

Weekly Prices of British Chemical Products

THERE have been no special features to record on the industrial chemicals market during the past week and the undertone in nearly all sections remains firm. Although the general movement continues along substantial lines, immediate delivery offers continue to be restricted in many cases by supply conditions. However, reports indicate that contract deliveries are reasonably satisfactory. The demand for the potash compounds remains strong and in excess of the quantity available, and the same may be said for quite a number of the soda products. Arsenic is in active request and a brisk demand is reported for formaldehyde. Amongst the acids boric, acetic, and oxalic are in good call, while supplies of both tartaric and citric acids are insufficient to meet the demand. Activity in the coal tar products sections is governed mainly by the supplies available, which in many sections of the markets are insufficient to meet the home demand. Steady to firm price conditions are maintained throughout the market, with the possible exception of xylol, which remains quiet.

MANCHESTER.—While there has been little in the way of actual movement of prices on the Manchester chemical market during the past week, sellers indicate a firm undertone in virtually every section and the likelihood of fresh advances in the near future is not lost sight of. The leading soda products and most of the other bread-and-butter lines of chemicals are moving steadily into consumption, chiefly against existing contracts, and further inquiries have been dealt with during the past few days. A moderate export inquiry has been in excess of the actual volume of business that can be arranged. The tar products are mostly firm and in steady request.

GLASGOW.—The Scottish heavy chemical trade business has improved considerably, particularly for home business, export business generally being restricted. Prices are firming up, the tendency being on the upgrade.

Price Changes

Rises: Alum, Ammonium Carbonate, Barium Chloride, Cadmium Sulphide, Carbon Black, Chlorine, Chrometan, Chromic Acid, Chromium Oxide, Cream of Tartar, Hydrochloric Acid, Iodine, Lead Acetate, Lead Nitrate, Methyl Acetone, Naphtha, Naphthalene, Pitch, Sodium Sulphate (Salt Cake), Sulphur, Tartaric Acid, Wood Naphtha.

Falls: Cresylic Acid, India-Rubber Substitutes (White), Pyridine, Vegetable Lamp Black, Xylol.

General Chemicals

Acetic Acid.—Maximum prices per ton: 80% technical, 1 ton £39 10s.; 10 cwt./1 ton, £40 10s., 4/10 cwt., £41 10s.; 80% pure, 1 ton, £41 10s.; 10 cwt./1 ton, £42 10s.; 4/10 cwt., £43 10s.; commercial glacial, 1 ton, £49; 10 cwt./1 ton, £50; 4/10 cwt., £51; delivered buyers' premises in returnable barrels, £4 10s. per ton extra if packed and delivered in glass.

Acetone.—Maximum prices per ton, 50 tons and over, £65; 10/50 tons, £65 10s.; 5/10 tons, £66; 1/5 tons, £66 10s.; single drums, £67 10s.; delivered buyers' premises in returnable drums or other containers having a capacity of not less than 45 gallons each. For delivery in non-returnable containers of 40/50 gallons, the maximum prices are £3 per ton higher. Deliveries of less than 10 gallons free from price control.

Alum.—Loose lump, £14 10s. per ton, f.o.b.

Aluminium Sulphate.—£10 5s. to £11 5s. per ton d/d.

Ammonia Anhydrous.—1s. 9d. to 2s. 3d. per lb.

Ammonium Carbonate.—£37 10s. per ton d/d in 5 cwt. casks.

Ammonium Chloride.—Grey galvanising, £22 10s. per ton, in casks, ex wharf. Fine white 98%, £19 10s. per ton. See also Salammoniac.

Antimony Oxide.—£111 to £117 per ton.

Arsenic.—For 1-ton lots, £41 to £46 per ton, according to quality, ex store; for 20-ton lots, £35 to £40 per ton d/d. Intermediate prices for intervening quantities.

Barium Chloride.—98/100%, prime white crystals, £16 15s. per ton, bag packing, ex works; imported material would be dearer.

Bleaching Powder.—Spot, 35/37%, £11 to £11 10s. per ton in casks, special terms for contract.

Borax, Commercial.—Granulated, £31 10s.; crystals, £32 10s.; powdered, £33; extra fine powder, £34; B.P. crystals, £40 10s.; powdered, £41; extra fine, £42 per ton for ton lots, in free 1-cwt. bags, carriage paid in Great Britain. Borax Glass, lump, £83; powder, £84 per ton in tin-lined cases for home trade only, packages free, carriage paid.

Boric Acid.—Commercial, granulated, £52 15s.; crystals, £53 15s.; powdered, £54 15s.; extra fine powder, £56 15s.; B.P. crystals, £61 15s.; powdered, £62 15s.; extra fine powdered, £64 15s. per ton for ton lots in free 1-cwt. bags, carriage paid in Great Britain.

Calcium Bisulphite.—£6 10s. to £7 10s. per ton f.o.r. London.

Calcium Chloride.—70/72% solid, £5 15s. per ton ex store.

Charcoal Lump.—£10 10s. to £14 per ton, ex wharf. Granulated, supplies scarce.

Chlorine, Liquid.—£23 per ton, d/d in 16/17 cwt. drums (3-drum lots).

Chrometan.—Crystals, 5½d. per lb.

Chromic Acid.—1s. 5d. per lb., less 2½%, d/d U.K.

Citric Acid.—1s. 5½d. per lb., normal; imported material, 1s. 10d. per lb. MANCHESTER: 1s. 8d. per lb.

Copper Oxide.—Black, £95 per ton.

Copper Sulphate.—About £31 per ton f.o.b. MANCHESTER: £31, less 2%, in 5 cwt. casks f.o.b. Liverpool.

Cream of Tartar.—100%, £18 12s. per cwt., less 2½%, d/d in sellers' returnable casks.

Formaldehyde.—£24 5s. to £25 10s. per ton d/d. MANCHESTER: 40%, £24 to £26 per ton in casks, according to quantity, d/d.

Formic Acid.—85%, £47 per ton for ton lots, carriage paid; smaller parcels quoted up to 50s. per cwt., ex store.

Glycerine.—Chemically pure, double distilled 1260 s.g., in tins, £4 to £5 per cwt., according to quantity; in drums, £3 12s. 6d. to £4 6s. Refined pale straw industrial, 5s. per cwt. less than chemically pure.

Hexamine.—Technical grade for commercial purposes, about 1s. 4d. per lb.; free-running crystals are quoted at 2s. 1d. to 2s. 3d. per lb.; carriage paid for bulk lots.

Hydrochloric Acid.—Spot, 6s. 5½d to 8s. 11d. per carboy d/d, according to purity, strength and locality.

Hydrofluoric Acid.—59/60%, about 1s. to 1s. 2d. per lb.

Iodine.—Resublimed B.P., 10s. 4d. to 14s. 6d. per lb., according to quantity.

Lactic Acid.—Dark tech., 50% by vol., £40 10s. per ton. Not less than one ton lots ex works; barrels returnable, carriage paid.

Lead Acetate.—White, 51s. to 54s. per cwt. MANCHESTER: £51 to £54 per ton.

Lead Nitrate.—About £47 per ton d/d in casks.

Lead, Red.—English, 5/10 cwt., £44 10s.; 1 cwt. to 1 ton, £44 5s.; 1/2 tons, £44; 2/5 tons, £43 10s.; 5/20 tons, £43; 20/100 tons, £42 10s.; over 100 tons, £42 per ton, less 2½ per cent., carriage paid, non-setting red lead, 10s. per ton dearer in each case.

Lead, White.—Dry English, less than 5 tons, £55; 5/15 tons, £51; 15/25 tons, £50 10s.; 25/50 tons, £50; 50/200 tons, £49 10s. per ton, less 5 per cent., carriage paid; Continental material, £1 per ton cheaper. Ground in oil, English, 1/5 cwt., £66 10s.; 5/10 cwt., £65 10s.; 10 cwt. to 1 ton, £65; 1/2 tons, £63 10s.; 2/5 tons, £62 10s.; 5/10 tons, £60 10s.; 10/15 tons, £59 10s.; 15/25 tons £59; 25/50 tons, £58 10s.; 50/100 tons, £58 per ton, less 5 per cent., carriage paid.

Litharge.—1 to 2 tons, £44 per ton.

Lithium Carbonate.—7s. 9d. per lb. net.

Magnesite.—Calcined, in bags, ex works, £18 15s. to £22 15s. per ton.

Magnesium Chloride.—Solid (ex wharf), £14 to £18 per ton. MANCHESTER: £14 to £16 per ton.

Magnesium Sulphate.—Commercial, £12 to £14 per ton, according to quality, ex works.

Mercury Products.—Controlled price for 1 cwt. quantities: Bichloride powder, 11s. 7d.; bichloride lump, 12s. 2d.; ammon. chloride powder, 13s. 5d.; ammon. chloride lump, 14s.; mercurous chloride, 13s. 9d.; mercury oxide, red cryst., B.P., 15s.; red levig. B.P., 15s. 6d.; yellow levig. B.P., 14s. 9d.; yellow red, 14s. 4d.; sulphide, red, 12s. 11d.

Methylated Spirit.—Industrial 66° O.P. 100 gals., 2s. 4d. per gal.; pyridinised 64° O.P. 100 gals., 2s. 5d. per gal.

Nitric Acid.—£24 to £26 per ton, ex works.

Oxalic Acid.—£60 to £65 per ton for ton lots, carriage paid, in 5-cwt. casks; smaller parcels would be dearer; deliveries slow.

Paraffin Wax.—Nominal.

Potash, Caustic.—Basic price for 50-100 ton lots. Solid, 88/92%, commercial grade, £55 7s. 6d. per ton, c.i.f. U.K. port, duty paid. Broken, £5 extra; flake, £7 10s. extra; powder, £10 extra per ton. Ex store, £3 10s. supplement. Liquid, d/d, £35 per ton.

Potassium Bichromate.—Crystals and granular, 7½d. per lb.; ground, 8½d. per lb., for not less than 6 cwt.; 1-cwt. lots, ½d. per lb. extra.
Potassium Carbonate.—Basic prices for 50 to 100 ton lots; calcined, 98/100%, £52 10s. per ton, c.i.f. U.K. port. Ex warehouse, £55 5s. per ton.
Potassium Chlorate.—Imported powder and crystals, nominal.
Potassium Iodide.—B.P., 8s. 8d. to 12s. per lb., according to quantity.
Potassium Nitrate.—Small granular crystals, £40 to £45 per ton ex store, according to quantity.
Potassium Permanganate.—B.P., 1s. 10d. per lb. for 1 cwt. lots; for 3 cwt. and upwards, 1s. 9½d. per lb.; technical, £7 18s. 6d. to £8 10s. 6d. per cwt., according to quantity d/d.
Potassium Prussiate.—Supplies scarce, prices nominal.
Salammoniac.—First lump, spot, £48 per ton; dog-tooth crystals, £50 per ton; medium, £48 10s. per ton; fine white crystals, £19 10s. per ton, in casks, ex store.
Soda, Caustic.—Solid 76/77%; spot, £15 7s. 6d. per ton d/d station.
Sodium Acetate.—£40 per ton, ex wharf.
Sodium Bicarbonate (refined).—Spot, £11 per ton, in bags.
Sodium Bichromate.—Crystals, cake and powder, 5½d. per lb., anhydrous, 6d. per lb., net d/d U.K.
Sodium Bisulphite Powder.—60/62%, £17 10s. per ton d/d in 2-ton lots for home trade.
Sodium Carbonate Monohydrate.—£21 per ton d/d in minimum ton lots in 2 cwt. free bags.
Sodium Chlorate.—£36 to £45 per ton, d/d, according to quantity.
Sodium Hyposulphite.—Pea crystals, £20 per ton for 2-ton lots; commercial £14 15s. per ton; photographic, £25 5s. per ton.
Sodium Iodide.—B.P., for not less than 28 lb., 9s. 6d. per lb., for not less than 7 lb., 13s. 1d. per lb.
Sodium Metasilicate.—£16 per ton, d/d U.K. in 1-ton lots.
Sodium Nitrate.—Refined, £15 5s. per ton for 6-ton lots d/d.
Sodium Nitrite.—£21 to £23 per ton for ton lots.
Sodium Percarbonate.—21½% available oyxgen, £7 per cwt.
Sodium Phosphate.—Di-sodium, £23 to £28 per ton d/d for ton lots. Tri-sodium, £25 to £30 per ton d/d for ton lots.
Sodium Prussiate.—7¾d. to 8½d. per lb. ex store.
Sodium Silicate.—£9 10s. to £10 12s. 6d. per ton, for 4-ton lots.
Sodium Sulphate (Glauber Salts).—£4 10s. ton d/d.
Sodium Sulphate (Salt Cake).—Unground. Spot £4 11s. per ton d/d station in bulk. MANCHESTER: £4 13s. 6d. per ton d/d station.
Sodium Sulphide.—Solid 60/62%. Spot, £17 15s. per ton d/d in drums; crystals, 30/32%, £12 7s. 6d. per ton d/d in casks.
Sodium Sulphite.—Anhydrous, £29 10s. per ton; Pea crystals, spot. £20 10s. per ton d/d station in kegs; commercial, £12 to £14 per ton d/d station in bags.
Sulphur.—For quantities not less than 4 tons, unground, unsieved and ungraded, £14 5s. per ton, ex store. Ground and sieved, £15 to £16 10s. per ton, ex store, according to mesh. Controlled prices.
Sulphuric Acid.—168° Tw., £6 10s. to £7 10s. per ton; 140° Tw., arsenic-free, £4 11s. per ton; 140° Tw., arsenious, £4 3s. 6d. per ton. Quotations naked at sellers' works.
Tartaric Acid.—4s. 4d. per lb., less 5%, carriage paid for lots of 5 cwt. and upwards. MANCHESTER: 4s. 4d. per lb.
Tin Oxide.—Snow white, 305s. per cwt.
Zinc Oxide.—Maximum prices: White seal, £30 17s. 6d. per ton; red seal, £28 7s. 6d. d/d; green seal, £29 17s. 6d. d/d.
Zinc Sulphate.—Tech., £20-£21 per ton, carriage paid, casks free.

Rubber Chemicals

Antimony Sulphide.—Golden, 1s. 2d. to 2s. 2d. per lb. Crimson, 2s. 2d. to 2s. 6d. per lb.
Arsenic Sulphide.—Yellow, 1s. 9d. per lb.
Barytes.—Best white bleached, £8 3s. 6d. per ton.
Cadmium Sulphide.—6s. to 6s. 6d. per lb.
Carbon Black.—6d. to 8d. per lb., according to packing.
Carbon Bisulphide.—£35 5s. to £40 5s. per ton, according to quality, in free returnable drums.
Carbon Tetrachloride.—£46 to £49 per ton.
Chromium Oxide.—Green, 2s. per lb.
India-rubber Substitutes.—White, 6 1/16d to 6 9/16d. per lb.; dark, 6d. to 6¾d. per lb.
Lithopone.—30%, £25 per ton; 60%, £31 to £32 per ton. Imported material would be dearer.
Mineral Black.—£7 10s. to £10 per ton.
Mineral Rubber, "Rupron."—£20 per ton.
Sulphur Chloride.—7d. per lb.
Vegetable Lamp Black.—£45 per ton.
Vermilion.—Pale or deep, 15s. 8d. for 7-lb. lots.
Plus 5% War Charge.

Nitrogen Fertilisers

Ammonium Phosphate Fertilisers.—Type B, £13 18s. 9d. per ton in 6-ton lots, d/d farmer's nearest station.
Ammonium Sulphate.—Per ton in 6-ton lots, d/d farmer's nearest station, June, £10 2s.
Calcium Cyanamide.—Nominal; supplies very scanty.
Concentrated Complete Fertilisers.—£14 8s. 9d. per ton in 6-ton lots d/d farmer's nearest station. Supplies small except C.C.F. Special.
"Nitro Chalk."—£9 14s. per ton in 6-ton lots, d/d farmer's nearest station.
Sodium Nitrate.—Chilean super-refined for 6-ton lots d/d nearest station, £15 5s. per ton; granulated, over 98%, £14 10s. per ton. Surcharges for smaller quantities unless collected at warehouse or depots.

Coal Tar Products

Benzol.—Industrial (containing less than 2% of toluol), 2s. 4d. per gal., ex works.
Carbolic Acid.—Crystals, 10d. to 11d. per lb. Crude, 60's, 4s. 3d. to 4s 6d., according to specification. MANCHESTER: Crystals, 9¾d. to 11½d. per lb., d/d; crude, 4s. to 4s. 6d., naked, at works.
Creosote.—Home trade, 6d. per gal., f.o.r., maker's works; exports, 6d. to 6½d. per gal., according to grade. **MANCHESTER: 6½d. to 9d. per gal.**
Cresylic Acid.—Pale, 97%, 3s. 6d. per gal.; 99%, 4s. 2d.; 99.5/100%, 4s. 4d. MANCHESTER: Pale, 99/100%, 4s. 6d. per gal.
Naphtha.—Solvent, 90/160°, 2s. 2d. to 2s. 6d. per gal.; heavy, 90/190°, 1s. 10d., naked at works. MANCHESTER: 90/160°, 2s. 2d. to 2s. 7d. per gal.
Naphthalene.—Crude, in 4-ton lots, in sellers' bags, £6 6s. 8d. to £9 7s. 7d. per ton, according to m.p. In sellers' bags, 2s. ton lots; hot-pressed, £11 3s. to £11 8s. per ton; purified crystals, £19 to £35 per ton. Controlled prices.
Pitch.—Medium, soft, 45s. to 55s. per ton, f.o.b. MANCHESTER: 44s. per ton at works.
Pyridine.—90/140°, 18s. per gal.: 90/160°, 13s. to 14s. MANCHESTER: 14s. to 18s. per gal.
Toluol.—Pure, 2s. 5d. nominal; 90's, 1s. 10d. per gal. MANCHESTER: Pure, 2s. 5d. per gal. naked.
Xylol.—Commercial, 3s. per gal.: pure, 3s. 2d. MANHCESTER: 2s. 9d. to 3s. 2d.

Wood Distillation Products

Calcium Acetate.—Brown, £21 per ton; grey, 24 MANCHESTER: Grey, £25 to £26 per ton.
Methyl Acetone.—40/50%, £56 per ton.
Wood Creosote.—Unrefined, about 2s. per gal., according to boiling range.
Wood Naphtha, Miscible.—4s. 6d. to 5s. 6d. per gal.: solvent, 5s. 6d. per gal.
Wood Tar.—£5 per ton.

Intermediates and Dyes (Prices Nominal)

m-**Cresol** 98/100%.—Nominal.
o-**Cresol** 30/31° C.—Nominal.
p-**Cresol** 34/35° C.—Nominal.
Dichloraniline.—2s. 8½d. per lb.
Dinitrobenzene.—8½d. per lb.
Dinitrotoluene.—48/50° C., 9½d. per lb.; 66/68° C., 1s.
p-**Nitraniline.**—2s. 5d. per lb.
Nitrobenzene.—Spot. 5½d. per lb., in 90-gal. drums, drums extra, 1-ton lots d/d buyer's works.
Nitronaphthalene.—1s. 2d. per lb.; P.G., 1s. 0½d. per lb.
o-**Toluidine.**—1s. per lb., in 8/10 cwt. drums, drums extra.
p-**Toluidine.**—2s. 2d. per lb., in casks.
m-**Xylidine Acetate.**—4s. 5d. per lb., 100%.

Latest Oil Prices

LONDON.—June 25.—For the period ending July 24, per ton, net, naked, ex mill, works or refinery, and subject to additional charges according to package and location of supplies: LINSEED OIL, crude, £46 10s. RAPESEED OIL, crude, £48 5s. COTTONSEED OIL, crude, £31 2s. 6d.; washed, £34 5s.; refined edible, £43 10s.; refined deodorised, £44 10s. COCONUT OIL, crude, £28 2s. 6d.; refined deodorised, £35 10s. PALM KERNEL OIL, crude, £27 10s.; refined deodorised, £35 10s.; refined hardened deodorised, £39 10s. PALM OIL, refined deodorised, £4' 10s.; refined hardened deodorised, £44 10s. GROUNDNUT OIL, crude, £35 10s.; refined deodorised, £44 10s.; refined hardened deodorised, £48 10s. to £49 10s. WHALE OIL, crude hardened, 42 deg., £30 10s.; refined hardened, 42 deg., £37 10s. ACID OILS.—Groundnut, £19; soya, £17; coconut and palm kernel, £22 10s. ROSIN, 26s. 6d. to 33s. per cwt., ex wharf, according to grade. TURPENTINE, American, 90s. per cwt., in drums or barrels, as imported (controlled price).

General News——From Week to Week

The Trading with the Enemy (Specified Persons) (Amendment) (No. 9) Orderr (S.R. & O. 1942 No. 1040, price 2s. 6d.), which came into force on June 16, is in consolidated form, and revokes all previous orders.

The Natural Sciences Tripos List, Part II, at the University of Cambridge, contains the names of four candidates who have passed the examination with first-class honours in chemistry: Messrs. C. E. Dalgliesh and J. Watson (Trinity), and V. R. Gray and J. W. G. Porter (Emmanuel).

Potato growers in Wales have been advised by the Ministry of Agriculture to spray their crops at once owing to an early outbreak of potato blight. Growers in the southern half of England are advised to have the material ready for spraying their potatoes at the beginning of July.

Under the Machinery, Plant and Appliances (Control) (No. 2) Order 1942 (S.R. & O. 1942, No. 1175, price 1d.), which came into force on June 18, new classes of machinery, plant and appliances are added to those already listed in the previous Order (S.R. & O. 1942, No. 1), and certain of the classes already listed are amended. Further, certain amendments have been made of the body of the previous Order.

More than 500 names of persons and firms in neutral countries with whom trading is illegal are included in the Trading with the Enemy (Specified Persons) (Amendment) (No. 10) Order, 1942 (S.R. & O. 1942, No. 1122; price 3d.). Names of chemical interest include: Anilinas "Colibri," Alvarez Thomas 1340, Buenos Aires; Cia. Argentina de Hierros y Aceros (suc. de José Pareja), Chiclana 3360, Buenos Aires; Soc. Química Importadora y Exportadora, Gazcón 352, Buenos Aires; S.A. Metalúrgica Otto Bennack, Rua 7 de Septembro, Joinville, Sta. Catharina, Brazil; Soc. Comercial de Tintas, Ltda., Rua da Candelaria 83, Rio de Janeiro; Productos Chimicos Elekeiroz S.A., S. Paulo; and Combustion Engineering Soc. de Resp. Ltda., Mexico (all branches). Deletions include the Cia. Brasileira de Carbureto de Calcio and Laboratorio Vitex, Rio de Janeiro; and Laboratorios Nutrex and Química Coyoacán S.A., Mexico City.

Foreign News

Exports of linseed oil from Argentina have been remarkably stimulated by the war. In the first quarter of 1942 exports amounted to 10,400 tons, valued at 6,227,000 pesos, against 9715 tons in the whole of 1941, and 92 tons in 1938.

To save iodine, tincture of iodine is being replaced in many cases in Germany by a 5 per cent. solution in alcohol of chlorated alkylated phenols in conjunction with quaternary ammonia salts.

The first Italian synthetic rubber factory, a 6000-ton plant erected by S.A. Industria Gomma Sintetica at Ferrara, is reported to be now ready to start production. The raw material used is alcohol.

A plant for the production of yeast, 2000 tons of which are to be added to feeding stuffs annually, is to be erected, with the approval of the Swiss Government, at Ems (Graubünden) by Holzverzuckerungs A.G.

The Danish alcohol factory at Hobro has carried out successful experiments on the distillation of sugar-beet and will use this material on a large scale this year. Beet distillation is said to be cheaper and simpler than that of potatoes.

Bauxite deposits in Spain, not hitherto exploited, have been located by Spanish Government authorities. It is reported that a new aluminium industry is to be organised in Barcelona with an annual production of 4000 tons. Spain could export the greater part of this, since her own requirements are covered by existing mines.

The growing shortage of alloy metals in Italy has caused A.M.M.I., the semi-official company for promoting the development of mineral products, to develop a scheme for constructing a plant to recover vanadium from oil residues. Vanadium traces are also found in bauxite, and this source is likewise to be utilised.

The Borregaard cellulose factory in Norway has completed plans for local production of its own carbon disulphide requirements, which were formerly imported from Germany. The extension of the factory involves an increase in capital from 10 million to 12 million kroner.

A new synthetic resin glue which is marketed as a dry powder and can be mixed with cold water without any of the auxiliary products normally used, is being produced by Henkel and Co., Düsseldorf. It is described as a low-molecular condensation product of melamine and formaldehyde.

The factory for the production of casein wool, under construction for S. A. Le Lanital Belge, has at last been completed, but whether it can start operations this year is stated to be doubtful, because all milk in Belgium is needed for human consumption and casein cannot be imported.

A new French company, the Compagnie Centrale d'Hydrogénation et de Synthèse, Paris, has been formed with a capital of 80,000,000 francs for the erection of plants for the extraction of oil from coal. The first plant, at Aix-en-Provence, will have a capacity of 25,000 tons each of petrol and methanol per annum.

With official approval of an appropriation of $8,235,000 for the development of guayule and other rubber-bearing plants in the Western Hemisphere, the U.S.A. is going ahead with the production of synthetic rubber. Guayule, it is believed, would not produce large quantities of rubber for war purposes, but this and other plants show promise as a permanent source of rubber.

Production of olivine in the U.S.A. last year—4723 short tons valued at $24,213—was the greatest since 1935. Olivine refractories have been made from North Carolina dunite for over ten years, but not until 1941 was the rock used as a commercial source of magnesium sulphate. The Olivine Products Corporation, Webster, N.C., produced magnesium sulphate by digesting crushed olivine in sulphuric acid, removing iron, and crystallising magnesium sulphate from solution. The product is sold to local tanneries and rayon plants.

A report from Antofagasta, Chile, states that a plant for refining sulphur by a new process is nearing completion. A monthly production of 400 tons is expected, with the possibility of increased production later on. It is understood that the Chilean raw material contains certain substances which, despite repeated experiments, do not respond to the standard methods of refining employed in Italy and the U.S.A., with the result that only about 50 per cent. (instead of some 85 per cent.) of refined sulphur has hitherto been obtainable.

The Government of India has issued a notification superseding the Open General Licence No. II previously applying to imports of most goods from the United Kingdom. Special import licences will now be required for the importation from this country into India of goods previously covered by the Open General Licence when such goods are despatched from the United Kingdom on through consignment on or after July 1. These licences will be valid in the first instance to cover shipments during the period of six months ending December 31, 1942. The notification has a similar effect as regards imports from Australia, Canada and Newfoundland.

Forthcoming Events

The annual general meeting of the **Society of Chemical Industry** will be held at the Royal Institution, Albemarle Street, London, W.1, by kind permission of the managers, on **July 10.** Luncheon will be in two parties, at the Trocadero and Messrs. Stewarts, at 12.30 for 1 p.m.; places allotted by ballot. The meeting, at 2.30 p.m., will be followed by tea at 4 p.m., at which the President and Mrs. Cullen will entertain members and their friends. The proceedings will conclude with the presentation of the Messel Medal to Sir John Russell, and the medallist's address.

Company News

Lever Brothers & Unilever, Ltd., have decided to redeem the whole of the £2,752,000 outstanding 5 per cent. consolidated debenture stock of the company on October 1 next.

Macleans, Ltd., report a net profit of £174,817 (£224,556), and have declared for the year an ordinary dividend of 30 per cent. (37½ per cent.).

Evans, Sons, Lescher and Webb, Ltd., report a trading profit for 1941 of £11,799 (65,880), and have declared a year's dividend on the 6 per cent. preference stock (1½ years' dividend).

Minimax, Ltd., have declared a final dividend of 8 per cent. and a bonus of 4 per cent., making a total of 20 per cent for 1941 (same). Profits for the year were £110,362 (£60,168).

Eastwoods Lewes Cement, Ltd., are paying a dividend of 5 per cent. (7½ per cent.) on the ordinary and the founders' shares for the six months to December 31, 1941.

The Morgan Crucible Co., Ltd., announce a trading profit, for the year ended March 31, of £536,812 (£685,267), and have declared a final dividend of 6¼ per cent., making 10 per cent. (same), for the year.

The Lautaro Nitrate Company reports that an interim payment of 1 per cent. on account of interest will be made on June 30 on first mortgage income debenture stock (same).

Lovering China Clays, Ltd., announce a profit for the year to March 31 of £11,766 (£13,864). After making provision for taxes, debenture interest, etc., net loss amounts to £3851 (£2568).

The Bleachers' Association, Ltd., announce a net profit for the year ended March 31, of £109,305 (£94,678), and six months' arrears of dividend are again being paid on the 5½ per cent. cumulative preference stock, bringing the dividend up to March 31, 1935.

Eastwoods Cement, Ltd., announce a dividend of 10 per cent. for the nine months to December 31, 1941, which compares with 12½ per cent. paid for the previous twelve months. Trading profit for the nine months amounted to £39,658 (£45,058 for the year.)

Tunnel Asbestos Cement, Ltd., report profits of £32,785 (£37,649), after depreciation and E.P.T. Interim dividend of 5 per cent on the ordinary remains total for the year (15 per cent. on smaller capital). Dividend on the deferred shares nil (10 per cent.). Forward £9352 (£8958).

New Companies Registered

Selecta Chemical Products, Ltd. (374,360).—Private company. Capital £500 in 500 shares of £1 each. Manufacturers and refiners of and dealers in petroleum and oil and their products and substitutes, chemicals, spirits, gums, fats, soaps, waxes, cellulose, pigment compositions, fruit extracts, jams and foods manufactured wholly or partly from chemical or allied substances, etc. Subscribers: S. Kaufman, G. M. Lancum. Solicitors: Shapiro, Kaufman and Co., 21 Buckland Crescent, N.W.3.

Chemical and Allied Stocks and Shares

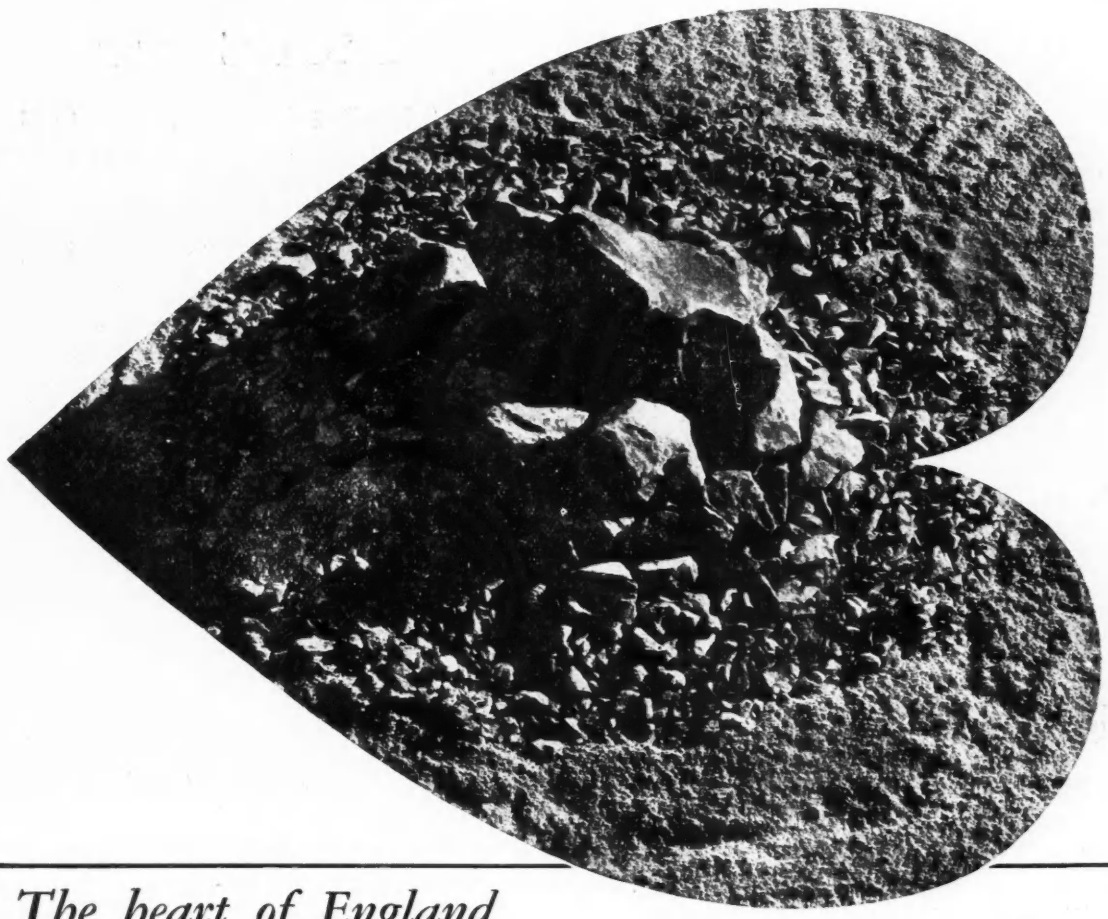
THE adverse war developments dominated all sections of the Stock Exchange, there having been further marking down of prices earlier in the week and contraction in the volume of business. When it was apparent that selling was again likely to be very moderate and that there was a continued tendency to take more than a short view, the general market undertone became steadier. Moreover, sentiment was assisted by the good impression created by the fact that, at the time of writing, declines on balance in British Government stocks have been only fractional in character. In many directions, securities remained so firmly held that they have continued to be in small supply in the market.

Among active shares of chemical and kindred companies, which usually move very closely with the general market trend, Imperial Chemical have declined further on balance from 32s. 1½d. to 31s. 7½d. at the time of writing; the 7 per cent. preference were 33s. 7½d. Turner & Newall were 68s. 9d., while United Molasses have gone back from 28s. to 27s. Moreover, although hopeful views remain current in regard to the impending dividend, the units of the Distillers Co. have eased from 75s. 9d. to 74s. 3d. Boots Drug were 34s. 6d. British Oxygen were 66s., compared with 66s. 6d. a week ago, and British Aluminium 43s. 6d., compared with 44s. Lever and Unilever were relatively steady, and at 27s. are, in fact, unchanged on balance, while steadiness was shown by Borax Consolidated at 31s. 3d., and by British Match at 34s.

Among other securities, Allied Ironfounders provided a good feature, having risen to 29s., on satisfaction with the dividend. Moreover, at the time of writing, General Refractories have further improved to 11s. 6d. Barry and Staines were steady at 32s. 6d., awaiting declaration of the dividend. Dividend estimates also continued to assist British Plaster Board, which were 23s., compared with 22s. 9d. a week ago. Associated Cement were 48s. 9d. Among textile issues, Bradford Dyers, Bleachers and various other shares were moderately lower as compared with a week ago, although Calico Printers tended to improve; lower prices ruled for Courtaulds and British Celanese. Elsewhere, Tube Investments were relatively steady at 82s. 9d., and Stewarts and Lloyds were 46s. 9d. Richard Thomas ordinary and preference were inclined to show a reaction following their recent improvement. United Steel were 21s. 4½d., and Dorman Long 16s. 4½d. Business at 23s. has been recorded in Morgan Crucible second preference following publication of the results; despite the lower profits, dividend requirements of both classes of preference shares remain covered with a substantial margin, and 10 per cent. is again paid on the ordinary shares.

Steadiness at 66s. 3d. was shown in B. Laporte, but as in many other instances where shares remain firmly held, dealings this week did not appar adequate to test quotations. Fison Packard kept at 38s. 9d. Business around 4s. was recorded in British Industrial Plastics, 2s. ordinary, and around 8s. 4½d. in Erinoid, while Lacrinoid Products 2s. shares transferred up to 3s. 1½d., a fair amount of attention having continued to be given to securities of companies connected with the plastics industry. Business up to 99 was recorded in Johnson Matthey 4 per cent. debentures. In other directions, British Tar Products have transferred around 7s., and there was a fair number of dealings in Leeds Fireclay preference shares, which ranged from 9s. 3d. to 9s. 10½d. British Drug Houses transferred at 18s. 9d. at one time.

Goodlass Wall have held the improvement which followed the recent publication of the results, business having been recorded this week up to 11s. British Glues 4s. shares were steady at 6s. 6d., awaiting the forthcoming dividend announcement. Forster's Glass 10s. shares remained under the influence of the maintenance of the 15 per cent. distribution, and were quoted at the higher level of 20s. United Glass Bottle were 53s. 9d. Triplex Glass eased to 31s. 1½d. Oil shares were again lower on balance.



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